BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Application of Milwaukee Water Works, Milwaukee County,
For Authority to Increase Water Rates — Docket No. 3720-WR-108

REBUTTAL TESTIMONY OF CHRISTOPHER KAEMPFER
June 13, 2014

Q. Please state your name and business address.

A. My name is Christopher Kaempfer, P.E. My office address is 650 East Jackson Street, Oconto Falls, WI 54154.

Q. Have you previously submitted direct testimony in this proceeding?

A. Yes.

Q. Have you reviewed the direct testimony and exhibits filed by Milwaukee Water Works, the Public Service Commission, and MillerCoors in this proceeding?

A. Yes.

Q. Do you have any response to that direct testimony?

A. Yes. MWW proposes to charge the wholesale customers a Fire Protection Charge. In my direct testimony I provide information in support of eliminating or reducing the Fire Protection Charge to the Village of Brown Deer (Brown Deer), the Village of Butler (Butler), the Village of Greendale (Greendale), the Village of Menomonee Falls (Menomonee Falls), the City of New Berlin (New Berlin), the City of Wauwatosa (Wauwatosa), and the City of West Allis (West Allis). In my rebuttal testimony I will provide information that will support eliminating or reducing the Fire Protection Charge from MWW to the City of Mequon. I will also provide information about problems with

the flow metering data used in the Customer Demand Study, and discuss why it is inappropriate to use that data in this rate case.

Q. Why should the Fire Protection Charge for Mequon be eliminated, or if not eliminated, at least reduced?

A. Fire Protection should not be charged to Mequon for the reasons explained in Eric Rothstein's and Andrew Behm's direct testimony. If the Commission determines that Fire Protection should be charged to Mequon, it should at least be reduced because of the way Mequon's system operates.

Q. How does the Mequon Water System operate?

A. The Mequon Water System has an East Pressure Zone and a West Pressure Zone. The East Pressure Zone serves approximately three-fourths of the City and the West Pressure Zone serves approximately one-fourth of the City. The West Pressure Zone of the Mequon Water System is at the same hydraulic grade line as the MWW Florist Pressure District. Water flows directly from the MWW Water System to the West Pressure Zone of the Mequon Water System. There is not a flow control device at the meter station.

The East Pressure Zone of the Mequon Water System is at a lower hydraulic grade line than the West Pressure Zone of the Mequon Water System. The hydraulic grade line of the West Pressure Zone of the Mequon Water System must be reduced to supply the East Pressure Zone of the Mequon Water System. The pressure reducing valves serving the East Pressure Zone of the Mequon Water System have the capacity to meet normal demand but not provide the desired fire flow throughout the pressure zone.

Q. What water supply facilities does the Mequon Water Utility have?

A. The East Pressure Zone of the Mequon Water Utility has two ground storage reservoirs with a combined capacity of 180,000 gallons with a booster pump station, an elevated storage tank with a capacity of 0.5 million gallons, and a booster pump station that supplies water from the North Shore Water Commission (NSWC) Water System through Bayside. The 0.5 million gallon elevated storage tank is not presently in service.

Q. How are the West and East Pressure Zones of the Mequon Water System supplied by MWW?

A. The West Pressure Zone of the Mequon Water System is supplied directly by the MWW Water System from the meter station. The meter station is equipped with two 8-inch flow meters. The East Pressure Zone of the Mequon Water System is supplied from the West Pressure Zone of the Mequon Water System through two pressure reducing valve stations.

Q. How is the flow rate from the MWW Water System into the East Pressure Zone of the Mequon Water System limited?

A. The flow rate into the East Pressure Zone of the Mequon Water System from the MWW Water System is limited by the capacity of the three pressure reducing valves at the two pressure reducing valve stations and the size and arrangement of the piping in the Mequon Water Distribution System.

Q. How would the East Pressure Zone of the Mequon Water System operate during a fire flow condition?

A. The water pressure in the water distribution system would drop as water is withdrawn to meet the fire flow. The pressure reducing valves would open to maintain the pressure in the East Pressure Zone. When the pressure in the water distribution system dropped to a

preset pressure, the booster pumps serving the East Pressure Zone from Bayside (i.e., from the North Shore Water Commission) would start and allow flow into the East Pressure Zone of the Mequon Water System. If the demand in the system plus the fire flow was greater than the flow rate from the pressure zone booster pump station and PRV valve stations, the water pressure in the water distribution system would continue to drop to the point where the fire flow would be limited by the residual pressure at the fire engine. The booster pump station would be adequate to provide a continuous fire flow of at least 1,000 gpm. The booster pumps at the ground storage reservoir would be placed in service if additional fire flow was needed. A fire flow of 1,000 gpm for over two hours could be provided by the 180,000 gallons of ground storage. An additional flow of 2,500 gpm for over two hours could be provided if the 500,000 gallon elevated storage tank was in service. If the demand in the system plus fire flow were less than the flow rate from the pressure zone booster pumps, the water pressure in the water distribution system would rise and stop the pressure zone booster pumps. The demand in the East Pressure Zone plus fire flow would then be met from the Pressure Reducing Valve Station serving the East Pressure Zone.

Q. What other items should be considered in evaluating the MWW Fire Protection Charge for Mequon?

A. The rate that Mequon withdraws water from the MWW Water System for the fire flow could not be increased by MWW during the fire flow condition in the East Pressure Zone. The maximum rate available for the fire flow could be decreased if MWW system pressure could not be maintained at the meter stations.

Q. What changes would you recommend be made in the Cost of Service Study with regard to Mequon?

A. I would recommend that the Public Fire Protection Charge and associated components be removed from wholesale rates for Mequon for the reasons given in Eric Rothstein's and Andrew Behm's direct testimony. If the Commission does not agree to make that adjustment, I would recommend that only one-fourth of the population of Mequon (i.e., the approximate population of the West Pressure Zone in Mequon) be used to calculate the Fire Protection Charge for the City of Mequon. Fire protection costs not allocated to Mequon should be reallocated to other customers that are being benefited by Public Fire Protection from the MWW Water System.

Q. Does this conclude your rebuttal testimony on the Fire Protection Charge for Mequon issue?

A. Yes.

Q. Do you have any other response to the direct testimony and exhibits offered by MWW?

A. Yes. I have concerns with the flow metering data used by MWW in the Customer Demand Study: My concerns are that:

1.) Some of the data has been adjusted in an inappropriate manner.

2.) The validity of some of the data is questionable.

3.) The interpretation of some of the data is inappropriate.

4.) The data is not being used uniformly for all customers.

Furthermore, given the short timeframe for this rate case, it is not possible to review all the information to determine how my concerns may affect the rate case.

Q. Please describe your concern regarding the inappropriate adjustment of data.

A. Adjusted data is data that was created to replace a gap in the actual data. This could have been created by a failure of the SCADA system to consistently transmit information. We found several instances where a gap in the actual data was replaced with an average of the missing flow data. This dampens the variability in the data. There is no mention of adjusting data in the Customer Demand Study. The only way of determining what data was adjusted is to review the spreadsheets with the raw data and adjustments. It would have been much better not to have adjusted the data. This would have let everyone know the true limitations of the data.

Q. Can you provide examples of how data was adjusted?

A. Yes, I will provide two examples of adjusted data.

<u>Example 1. West Allis.</u>

MWW uses totalizer data from the flow meters at each meter station to calculate use in 100 cubic feet (ccf) on an hourly basis.

Kaempfer & Associates, Inc. used the raw data from MWW to create flow rate graphs for the period of July 14 – July 18, 2012. Flow rate graphs were created for the total use for each customer using the running total calculated by MWW. Flow rate graphs for each meter station for each wholesale customer were created using the totalizer values provided by MWW.

On occasion, the actual use data is not correctly represented by the totalizer data. For example, during the period of 10:00 a.m. on June 30, 2012 through 10:00 a.m. on July 17, 2012, the totalizer data for the two flow meters in the W. Pierce Street Meter Station for the City of West Allis did not get properly recorded to determine use on an

hourly basis. The use data for the W. Pierce Street meters was estimated by MWW to provide hourly use values. Totalizer values from 9:00 a.m. on June 30, 2012 and 11:00 a.m. on July 17, 2012 were used to calculate the total volume of water that passed through each meter. Hourly use data was then estimated by MWW by dividing the total volume that passed through each meter by the 410 hours when incorrect totalizer data was recorded.

The calculated hourly use data was then added to the difference between the maximum hourly totalizer values for the meters at the W. National Avenue Meter Station to provide an estimated total hourly use. MWW highlights the estimated calculated running total values in yellow when actual totalizer values are not available.

W. Pierce Meter 1

Totalizer Value at 9:00 am on June 30, 2012 = 613770.6 ccf

Totalizer Value at 11:00 am on July 17, 2012 = 654486.8 ccf

654486.8 – 613770.6 = 40,716.2 ccf

$$\frac{40{,}716.2 \text{ ccf}}{410 \text{ hours}} = 99.308 \text{ ccf/hour}$$

W. Pierce Meter 2

Totalizer Value at 9:00 am on June 30, 2012 = 492365.9 ccf

Totalizer Value at 11:00 am on July 17, 2012 = 529751.7 ccf

529751.7 – 492365.9 = 37,385.8 ccf

$$\frac{37{,}385.8 \text{ ccf}}{410 \text{ hours}} = 91.185 \text{ ccf/hour}$$

Example 2. Menomonee Falls.

MWW performed a similar calculation for the Village of Menomonee Falls for the flow meters at the W. Bradley Meter Station for the period of 7:00 a.m. to 10:00 a.m. on July 18, 2012, and the period of 10:00 p.m. on July 18, 2012 to 12:00 a.m. on July 19, 2012.

A correction of 847.7/4 was made for the period of 7:00 a.m. to 10:00 a.m. on July 18, 2012. The basis for the value of 847.7 is unknown based on the totalizer data provided by MWW. The totalizer values for the two meters is shown below:

W. Bradley Meter 1

Totalizer Value at 6:00 am on July 18, 2012 = 732253.82 ccf

Totalizer Value at 11:00 am on July 18, 2012 = 732751.95 ccf

732751.95 – 732253.82 = 498.13 ccf

W. Bradley Meter 2

Totalizer Value at 6:00 a.m. on July 18, 2012 = 592300.9 ccf

Totalizer Value at 11:00 a.m. on July 18, 2012 = 592806.1 ccf

592806.1 – 592300.9 = 505.2 ccf

Sum of volume of water from meters

498.13 + 505.2 = 1003.33

A correction of 622.2/3 was made for the period of 10:00 p.m. on July 18, 2012 to 12:00 a.m. on July 19, 2012. The basis for the value of 622.2 is unknown based on the totalizer data provided by MWW. The totalizer values for the two meters is shown below:

W. Bradley Meter 1

Totalizer Value at 9:00 p.m. on July 18, 2012 = 733712.13 ccf

Totalizer Value at 1:00 a.m. on July 19, 2012 = 734107.65 ccf

734107.65 – 733712.13 = 395.52 ccf

W. Bradley Meter 2

Totalizer Value at 9:00 p.m. on July 18, 2012 = 593686.8 ccf

Totalizer Value at 1:00 a.m. on July 19, 2012 = 594057.4 ccf

94057.4 – 593686.8 = 370.6 ccf

Sum of volume of water from meters

395.52 + 370.6 = 766.12

Q. Please describe your concern regarding the questionable validity of some of the data.

A. I consider data that produces results that are unreasonable to be bad data. I will provide two examples of bad data.

Example 1. Wauwatosa.

The hourly totalizer data from each flow meter was used to calculate the hourly flow rate through each meter station for each wholesale customer for the period of July 14, 2012 through July 18, 2012.

The data for the W. State Street Meter Station in the City of Wauwatosa appears to be bad. It appears that the second meter at the meter station records flow when the first meter at the meter station records zero flow. Flow Meter No. 2 at the W. State Street Meter Station recorded an hourly average flow rate ranging from 69.3 gpm to 507.6 gpm when Flow Meter No. 1 recorded an hourly average flow rate of zero for the four-day period.

The hourly totalizer data for the W. State Street Meter Station during the month of July 2013 was used to calculate and graph hourly flow rates for comparison. The

calculated hourly flow rates for each meter show a similar pattern. The flow rate measured by Flow Meter No. 2 is approximately 75 percent of the flow rate measured by Flow Meter No. 1.

Example 2. Greendale.

The totalizer data for the meter stations at College Avenue and W. Edgerton Avenue in the Village of Greendale is incorrect for the time period of 9:00 a.m. to 10:00 a.m. on June 28, 2012. The totalizer data indicates zero flow for 9:00 a.m. at each meter station. The totalizer data indicates an hourly average flow rate of 1,810 gpm and 1,806 gpm at 10:00 a.m. for the two meter stations.

MWW also records the minimum, maximum, and average flow rate for each meter on an hourly basis. The flow rate information recorded by MWW was as follows:

Station	Time	Flow Rate, gpm		
		Minimum	Maximum	Average
College Avenue	9:00 a.m.	699.2	699.2	699.2
	10:00 a.m.	683.7	714.5	700.4
W. Edgerton	9:00 a.m.	703.1	703.1	703.1
Avenue	10:00 a.m.	691.8	709.9	709.2

It appears the totalizer value at 9:00 a.m. was not recorded and the volume of water measured by the two meters for a two hour period was allocated to the 10:00 a.m. totalizer value. This results in a 3,616 gpm average hourly flow rate at 10:00 a.m. The actual hourly average flow rate through the two meter stations at 10:00 a.m. is 1,409.6 gpm.

Q. Please describe your concern regarding the inappropriate interpretation of some of the data.

A. The data for the wholesale customers is very different than the data for the retail customers. You must know how the water system of the wholesale customers operates so you can understand the characteristics of the demand.

Q. Can you provide examples of how interpretation of the data for wholesale customers can be inappropriate?

A. Yes. I will provide two examples of inappropriate interpretation of data.

Example 1. City of New Berlin.

The capacity of the two New Berlin Supply Point Booster Pump Stations is set to not exceed 5.4 mgd. The maximum hour demand from New Berlin is therefor limited to 5.4 mgd (3,750 gpm). The maximum day demand is governed by the length of time the booster pump stations operate. If it is a wet year, the booster pump stations may only operate at 50 percent of the time on the maximum day. The maximum day demand would therefore be 2.7 mgd and the maximum hour to maximum day peaking factor would be 2.0. If it was an extremely dry year, the booster pumps may operate at 100 percent of the time on the maximum day. The maximum day demand would be 5.4 mgd and the maximum hour to maximum day peaking factor would be 1.0. This analysis would indicate that the true impact on the MWW Water System during critical conditions is only on the maximum day demand and not the maximum hour demand.

Example 2. Greendale.

The time of day must be considered in the evaluation.

The Greendale Water System has two ground storage reservoirs that are filled from the MWW Water System. The filling rate is regulated by a control valve. The valve is set to maintain a flow rate of 4,000 gpm. The control valve is typically open for a four to six-hour period each day. The period that the ground storage reservoir fills varies each day. If the fill period occurs at night, the 4,000-gpm flow should not be considered as part of the maximum hour demand. If the fill period occurred during the

time of 7:00 p.m. to 9:00 p.m. when the MWW Water System peaked, it should be considered as maximum hour demand.

If the demand occurred during the maximum hour, it would be very easy for Greendale to delay filling the ground storage reservoirs until midnight or reduce the filling rate to 1,000 gpm for a 16 to 24-hour period. If the ground storage reservoirs were filled from midnight to 6:00 a.m., Greendale should not be penalized for operating their system when the MWW Water System has excess capacity.

Q. Do you have any concerns on how MWW has used their data?

A. Yes. I have concerns on how MWW has been using their data to calculate MWW's own maximum hour demands. The Customer Demand Study indicates the maximum hour demand for July of 2012 was 7,564,902 gallons per hour (181.56 mgd). Attachment 1 of PSC Ref# 204308 indicates the maximum hour demand in 2012 was 7,291,667 gallons per hour (175.00 mgd).

The wholesale customers requested flow and level data for July of 2012 to determine which value was correct. From the data provided, we determined that the maximum hourly demand in the MWW Water System occurred on July 16, 2012 at 8:00 p.m. (07/16/12 20:00:00). The flows entering the MWW Water System at this time were as follows:

Howard High Lift Pump Station	51.3 mgd
North Point High Lift Pump Station	29.7 mgd
Riverside High Lift Pump Station	81.9 mgd
	162.9 mgd
Lincoln Re-Pump Station	21.4 mgd
Florist Re-Pump Station	14.1 mgd
	35.5 mgd
Hawley Elevated Storage Tank	3.3 mgd
Greenfield Elevated Storage Tank	6.1 mgd
	9.4 mgd

TOTAL Maximum Hour Demand 207.8 mgd

This data indicates that MWW has not been calculating their maximum hour demand correctly.

Q. Do you have information to support the statements in your testimony?

A. Yes.

Q. Will you submit the supporting information if there are questions on your testimony?

A. Yes.

Q. Does that conclude your testimony?

A. Yes. Thank you.